*भारतीय मानक*
*Indian Standard*

**IS 12619 : 2022**

# मुद्रण उद्योग — सुरक्षा संहिता

*( पहला पुनरीक्षण )*

# Printing Industry — Safety Code

( *First Revision* )

ICS 13.110; 37.100.10

© BIS 2022

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली – 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.gov.in www.standardsbis.in

**February 2022** **Price Group 4**

Printing Machinery Sectional Committee, MED 25

## FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Printing Machinery Sectional Committee had been approved by the Mechanical Engineering Division Council.

This standard was first published in October 1989. Experience gained in implementation of this Standard necessitates this revision and certain changes that are necessary have been incorporated.

Following important changes have been incorporated in this revision:

a) Applicable safety requirements for pre-press/post-press activities;
b) Different types of mechanical safety guards for offset printing machines;
c) Prestart warning devices and safety signals;
d) Special requirements for safeguarding danger zones; and
e) Guidelines for electrical safety devices.

The fact that a factory, including the printing processes, needs safety measures does not call for any emphasis nor elaboration. The *Factories Act*, 1948 lays down certain norms regarding safety measures for the employees in a factory in general.

In this standard only the safety requirements relevant to specific plant and machinery involved in printing industry, such as foundry, photolitho, printing machines, cutting and binding machines have been enumerated. Other general safety requirements for building, electricity, fire-fighting arrangements, effluents and environment control, etc, as applicable to any other industry shall have to be in compliance with *Factory Regulation Act*, 1948, prevailing in respective states where they are located.

This standard has been prepared keeping the provision of the Act in view so that this does not contravene the Act. Attempt has also been made to avoid repetition of the Act in this code.

Wherever the word 'Act' appears in this standard, it refers to *Factories Act*, 1948; whenever the word "Rule" appears in this standard, it refers to Delhi State Factory Rules.

Under the *Factories Act*, Factory Rules are framed by the different State Governments for their respective States. For obvious reasons, rules of all the states could not be quoted. Rules might vary from state to state but the basic approach of the rules of the different states are the same. In this Indian Standard, Rules of Delhi State have been quoted for illustration purposes and also as a guide for furtherance of the safety measures.

The composition of the Committee responsible for the formulation of the standard is given in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values ( *revised* )'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard*

# PRINTING INDUSTRY — SAFETY CODE

( *First Revision* )

## 1 SCOPE

This standard specifies the safety requirements applicable to all types and sizes of printing industry ranging from small scale to large scale industries engaged in either the total process of paper printing or part thereof.

## 2 REFERENCES

The Indian Standards listed in Annex A contain provisions which through reference in this text constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

## 3 APPLICABLE SAFETY REQUIREMENTS

**3.1** Area-wise safety requirements shall be as follows.

### 3.2 Type Foundry

a) Automatic temperature regulation by thermostat control shall be provided with the electric furnaces;

b) Guards shall be provided around all continuous moving parts such as pulleys;

c) There shall be proper provision of ventilation and flow of free air to drive the fumes coming out of the crucible;

d) Adequate room height and space for proper ventilation shall be maintained;

e) Dress collection shall be done in closed containers and kept at a minimum distance of 3 m from the casting machine to prevent lead poisoning;

f) Near the working area, proper exhaust shall be provided to avoid fumes; and

g) Fire hazard shall be reduced as far as possible. Suitable fire extinguishers as per local area regulations guaranteed to function effectively shall be kept ready in case of need and installed in places which are readily accessible.

### 3.3 Letter Press

a) Electrical interlocks shall be provided for guards required to be opened during operation; and

b) In multi-unit machines stop, inch, run and emergency stop shall be provided within easy reach of the operator or a starting alarm shall be provided.

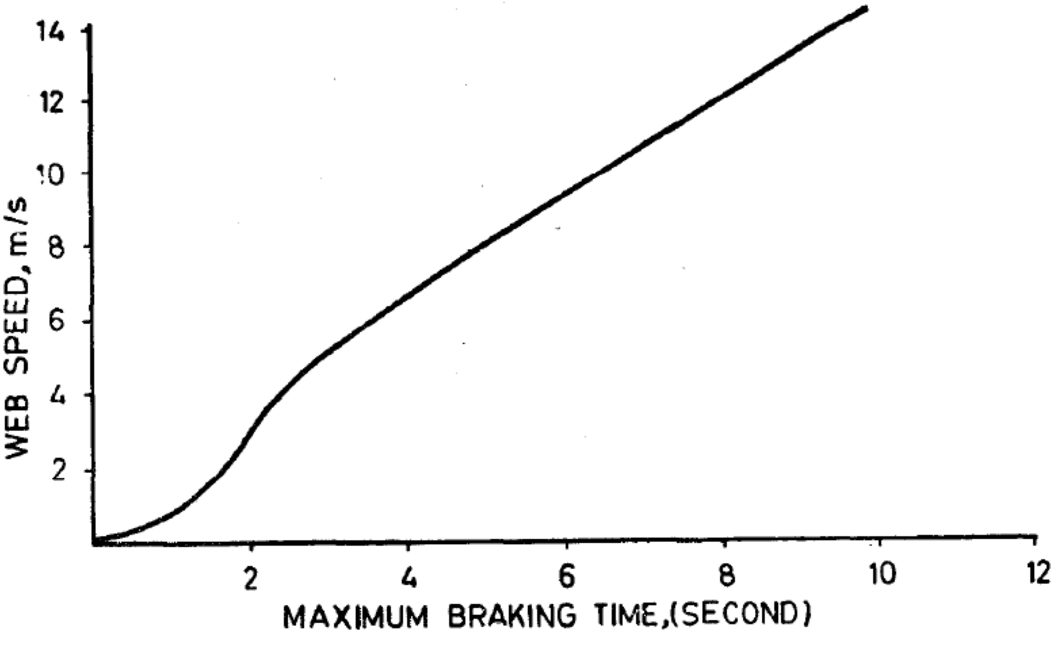

FIG. 1 BREAKING TIME GRAPH FOR WEB OFFSET MACHINE

## 3.4 Offset Printing Machines

**3.4.1** *General Safety Requirements for Offset Printing Machines*

Printing machines must be provided with safety devices to protect the operator against mechanical and electrical hazards during the operation and maintenance of the press line. Movement of machine parts, electric energy, sharp edges, heat, noise, chemicals, etc, may create these hazards.

All these hazards cannot be avoided by design measures because of the functional requirement of the machine/mechanism and hence safety measures are required to protect the operator from these hazards.

Safety measures/devices are broadly classified in three categories.

**3.4.1.1** *Mechanical safety guards*

There are three types of safety guards.

**3.4.1.1.1** Interlocking guards with guard locking act as follows:

a) The hazardous movements safeguarded by the device cannot be carried out unless the guard is closed, interlocked and locked; and
b) The guard remains closed, interlocked and locked until the hazardous movement is stopped.

**3.4.1.1.2** Interlocking guards without guard locking act as follows:

a) The hazardous movements covered by the guard cannot operate unless the guard is closed;
b) If the guard is opened during a hazardous movement, a stop instruction is given; and
c) When the guard is closed, the hazardous movements covered by the guard can be started, but the closure of the guard does not by itself initiate the hazardous movement.

**3.4.1.1.3** Mechanical safety guards (without interlocks) should be positioned in such a way that no part of the human body gets dragged into the rotating nip of the printing machine.

**3.4.1.2** *Hold-to-run control devices*

Control devices, which initiate and maintain the operation of parts of the machine as long as the manual control is actuated. The actuator returns automatically to the stop position when released. The operation is stopped immediately.

Hold-to-run control devices allow operation with a maximum an operating speed of 1 m/min or with a displacement limited to 25 mm. It can be deviated up to operating speed of 5m/min or displacement of 75mm where there is no drastic increase in the hazard is expected.

**3.4.1.3** *Emergency stop devices*

Machines must be fitted with an emergency stop device at appropriate and approachable locations to enable the operator to stop the machine instantly in case of the hazardous conditions.

Emergency stop devices must satisfy the following requirements:

a) The emergency stop actuator must remain engaged;
b) Disengaging the actuator must not result in the machine to restart, but shall only permit restarting;
c) The emergency stop signal must override all other commands;
d) The emergency stop function must not impair the capability of any safety device or facility with safety-related functions;
e) The emergency stop function must not impair any facilities designed to release trapped persons; and
f) Emergency stop actuators must be designed for easy actuation.

**3.4.2** In addition to the above three safety measures, the following provisions are necessary on the machine.

**3.4.2.1** *Provisions for manual rotation of printing machine aggregates with electrical interlocks*

Provision should be there to rotate the press line or its aggregates manually by inserting the hand wheel (crank) connected with an interlocking device, so that in case of normal run, the hand wheel should not get inserted.

**3.4.2.2** *Pre-start warning devices*

Audible pre-start warning devices must be provided on the machine to indicate start-up of the machine. This device must produce sufficient sound for at least 3s to alert the persons near machine and machine must not take other commands till 3s after sound stops.

If machine is stopped for more than 12s an emergency stop is actuated during machine run, audible device must operate before machine re-start.

**3.4.2.3** *Warning safety signals*

Despite providing all safety devices on the machine, few danger points may remain in the machine because of design constraint or product profile. In such cases the warning of risks must be displayed on the machine by using symbol plates and same is to be mentioned in the operating manual.

**3.4.3** *Design Guidelines for Safety Guards*

Guards must fulfil the following requirements.

**3.4.3.1** *General requirements*

a) Guards must be strong enough and reliable;
b) Guards must not generate new danger points;

c) They must not be easily defeated or made ineffective;
d) When openings are provided, they must be at sufficient distance from hazardous zone. Operator should be able to observe the process wherever required without disturbance of the guards;
e) They must be firmly clamped in their position;
f) They must either be fastened in such a way that they can only be opened by the use of the proper tool or they must be interlocked with the hazardous movement; and
g) After removing clamping/fasteners they must not retain their guarding position as far as possible.

**3.4.3.2** *Fixed and interlocking guards*

Guards which are removed or opened less frequently or for maintenance purposes only must always be fastened to the machine frame in such a way that release is only possible using a proper tool.

Guards which are opened frequently or for setting-up must be interlocked with the hazardous movement in such a way that hazardous movements are promptly stopped after the guard has been opened or removed.

**3.4.3.3** *Special requirements for safeguarding danger zones*

a) Danger zones must be safeguarded by fence-type enclosures or photo-electric devices provided at a height of 400 and 900 mm; and
b) Danger points can also be safeguarded by photo-electric beams or other kinds of electro-sensitive protective devices. However, it is important to note that adequate safety distances must be maintained.

**3.4.3.4** Access to the danger zone must be safeguarded, for example by:

a) Access gates which are interlocked with the hazardous movement;
b) Electro-sensitive protective devices (for example photo-electric devices); and
c) No enabling device in the Danger zone area, to avoid press operation from the Danger zone area.

**3.4.3.5** *Guidelines for electrical safety devices*

**3.4.3.5.1** *Devices for switching, control and signalling*

Control devices are used to start and stop machines. Such devices must meet certain requirements in order to avoid persons being exposed to risks from hazardous movements.

Control devices can be electrical push buttons, self-sustaining or not self-sustaining etc. They must be designed and located as to be within easy and safe reach of the operator. Start buttons initiating hazardous movements, for example, machine start or hold-to-run operation, must be protected against inadvertent actuation.

**3.4.3.5.2** *Supply disconnecting devices*

Separate supply disconnecting devices must be provided for each source of supply used in order to ensure that work that needs to be done on the machine (maintenance and repair work on mechanical components, electrical equipment, hydraulic or pneumatic equipment, cleaning, etc.) can be carried out safely.

Supply disconnecting devices are allowed to have only one ON and one OFF position which determines either the beginning of the power supply or the isolation from the source.

Where two or more disconnecting devices are provided, protective interlocks are required to prevent hazardous situations or damage to the machine or the product.

Supply disconnecting devices, which are used as emergency stop devices must have at least the required power breaking capacity. Dis-connectors must be identified by a red switching element on a yellow background.

**3.4.3.5.3** *Requirements for emergency stop devices:*

a) Hazardous movements are interrupted;
b) Controls remain in the OFF position after actuation (control system remains in OFF Mode);
c) No restart of the machine is possible until disengaged;
d) Disengaging does not allow machine start;
e) Striking marking colours (red actuator on yellow background); and
f) Actuation of the emergency stop device must not initiate hazardous movements.

### 3.5 Paper Cutting/Guillotine Machine and Three Knife Trimmer

a) Operating switch shall be in series connection with photocells so that machine shall not start in case operator’s hand is near the shear blades;
b) Cut ends or fluffs shall not be accumulated on the passage causing obstruction to easy movements of other material. It shall be collected in a bin at a safe place;
c) The knife shall be properly guarded in its raised position;
d) Hydraulic system shall be in conformity with relevant safety regulation; and
e) Two-push-button system shall be provided in machines for the safety of the operator. This shall be applicable for cutting and guillotine machines and shall not be applicable for three-knife trimmer. Wherever possible, limit switches may be provided.

### 3.6 Folding, Binding, Stitching, Perforating and Punching Machines

a) Suitable guards shall be provided for all moving parts;

b) Control switch shall be within the reach of the operator;

c) Machine shall have emergency stop switches; and

d) Rejected wire, strings, paper slags shall be collected in a place away from the operating area.

### 3.7 Plate Making Machines

Exhaust for fumes and suitable effluent control for the chemicals handled shall be provided.

### 3.8 Block Making Machine

Mechanical guard shall be provided.

### 3.9 Photographic Studio

a) *Camera* — Suitable firefighting equipment shall be provided.

b) *Developer*

   1) Good fume exhaust arrangement shall be provided; and

   2) Chemicals shall be disposed of as per effluent regulation.

c) *Step and Repeat Machine* — Proper ventilation shall be provided. Where arc lamp is used instead of halogen lamp, proper protection against flash for the eyes shall be provided.

d) *Artist Table Retouching Table and Drawing Table*

   1) Suitable firefighting equipment shall be provided.

   2) All electrical equipment shall be properly earthed.

e) *Film*

   1) Separate storage space shall be provided for films in a place away from the process area as a precaution against fire hazards.

   2) Proper fume exhausting arrangements shall be provided.

   3) Suitable firefighting equipment shall be provided.

**3.10 Storage of oil, Greases and flammable inks and thinners** — Suitable safe storage facilities shall be provided for oils, grease, flammable inks and thinners in compliance with safety regulations under the Act. Adequate precautions shall be taken with regard to 'NO SMOKING' instructions and provisions for suitable fire fighting equipment.

### 3.11 Generator

Industries having their own generating set for captive power shall take adequate precautions in regard to its location, maintenance, storing of fuels, etc.

### 3.12 General Stores (Paper)

a) Store and passage ways shall be kept clear and in good condition;

b) Materials stored in tiers shall be stacked, blocked, interlocked and limited in height so that they are stable and secured;

c) Storage areas shall be kept free from possible hazards from tripping. Adequate clearance shall be provided with sprinkler heads or suitable firefighting equipment; and

d) In indoor/internal storage areas, smoking shall be strictly prohibited.

### 3.13 Gas Dryer/IR Dryer/UV Curing Unit on Printing Machines

a) Exhaust ducting as per recommendation from equipment manufacturer should be provided to remove harmful exhaust gases;

b) Operator safety instruments recommended by equipment manufacturer should be provided;

c) Safety instructions provided by equipment manufacturer should be followed;

d) Separate storage space shall be provided for consumables used in these equipment in a place away from the process area as a precaution against fire hazards; and

e) Fire hazard shall be reduced as far as possible. Suitable fire extinguishers as per local area regulations guaranteed to function effectively shall be kept ready in case of need and installed in places which are readily accessible.

### 3.14 Other Safety Procedures to be Followed for All the Above Machines

**3.14.1** *Following Lock Out Tag Out Procedure* (*LOTO*) *During Maintenance Work* (Refer IS 5216 (Part 1)

It requires that, "The employer shall establish a(n) (energy control) program consisting of energy control procedures, employee training and periodic inspections to ensure that before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, start-up or release of stored energy could occur and cause injury, the machine or equipment shall be isolated from the energy source and rendered inoperative."

Key elements to a successful lockout tag out program:

a) Develop and document a lockout tag out program or policy;

b) Write machine/task specific lockout tag out procedures;

c) Identify and mark energy isolation points;

d) Lockout tag out training and periodic inspection/audits;

e) Provide proper lockout tag out devices; and

f) Sustainability.

**3.14.2** *Installation of Earth Leakage Circuit Breaker* (*ELCB*) *Protection* (Refer IEC TS 60079-32-1)

Key elements to a successful static electricity program:

a) General precautions: environment, work, periodical inspection;

b) Measures against static electricity during work;

c) Measures against static electricity after mounting;

d) Human body protection; and

e) Electrostatic breakdown model of semiconductor device.

**3.14.3** *Protection Against Static Electricity Hazard* (Refer IS 12640 (Part 1))

Residual current operated circuit breakers for household and similar uses, circuit breaker is used for the protection against electrical leakage in the circuit of 50Hz/60Hz, rated voltage single-phase 240V, 3-phase 415V, rated current up to 60A. When somebody gets an electric shock or the residual current of the circuit exceeds the fixed value, the ELCB can cut off the supply within the specified limit.

Advantages of earth leakage circuit breaker:

a) It is inexpensive as well as efficient;

b) It guards humans and animals against electrical shock; and

c) ELCB can sense the coil by sufficient voltage to cause it to safety trip.

## ANNEX A

( *Clause* 2 )

### LIST OF REFERRED INDIAN STANDARDS

| *IS No./Other Publication* | *Title* |
|---|---|
| 5216 (Part 1) : 1982 | Recommendations on safety procedures and practices in electrical work: Part 1 general (*first revision*) |
| 12640 (Part 1) : 2016 | Residual current operated circuit breakers without integral overcurrent protection for household and similar uses (RCCBs): Part 1 General rules (*second revision*) |
| IEC TS 60079-32-1 : 2013 | Explosive atmospheres — Part 32-1: Electrostatic hazards, guidance |

# ANNEX B

( *Foreword* )

## COMMITTEE COMPOSITION

Printing Machinery Sectional Committee, MED 25

| *Organization* | *Representative(s)* |
|---|---|
| Former Director, Directorate of Printing, New Delhi | Shri A. K. Bansal (***Chairman***) |
| All India Federation of Master Printers, New Delhi | Shri Harjinder Singh<br>President AIFMP (*Alternate*) |
| Autoprint Machinery Manufacturers Private Limited, Coimbatore | Shri K. G. Suresh<br>Shri P. S. Balasubramanian (*Alternate*) |
| Department of Printing Technology, Haryana | Prof Anjan Kumar<br>Shri Ankit Boora (*Alternate*)<br>Shri Bijender (*Young Professional*) |
| Government of Karnataka Department of Printing Stationery and Publication, Bengaluru | Shri Ravishankar |
| Indian Printing Packaging and Allied Machinery Manufacturers Association, Noida | Shri S. Dayakar Reddy<br>Shri Prashant Vats (*Alternate*) |
| Karnataka State Printer Association, Bengaluru | Shri T. V. Mukund<br>Shri B. L. Srinivasa (*Alternate*) |
| Manugraph India Limited, Kolhapur | Shri Mahesh Madhukar |
| Office of Development Commissioner (MSME), New Delhi | Shri Umesh Shukla<br>Shri K. Singh Sodhi (*Alternate*) |
| Savitribai Phule University, Ganeshkhind, Pune | Dr Dattatraya Kute |
| TechNova Imaging Systems India Private Limited, Mumbai | Shri Iyer Murali Krishnan<br>Shri Shiva Subramanian (*Alternate*) |
| The Printers House Private Limited, Ballabhgarh | Shri S. K. Dixit<br>Shri D. P. Dabas (*Alternate*) |
| In Personal Capacity (*A-302, Srabasti Cooperative Housing Society Limited, B-13 Sammilani Park, Kolkata 700 075*) | Shri Diptendu Chowdhury |
| BIS Directorate General | Shri Rajneesh Khosla, Scientist ‘E’ and Head (MED) [ Representing Director General ( *Ex-officio* ) ] |

*Member Secretary*

Shri Lokraj Meena
Scientist ‘B’ (MED), BIS

**Bureau of Indian Standards**

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

**Copyright**

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

**Review of Indian Standards**

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc No.: MED 25 (12914).

## Amendments Issued Since Publication

| Amend No. | Date of Issue | Text Affected |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

**BUREAU OF INDIAN STANDARDS**

**Headquarters:**

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
*Telephones*: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

**Regional Offices:**

| | | *Telephones* |
|---|---|---|
| Central | : Manak Bhavan, 9 Bahadur Shah Zafar Marg<br>NEW DELHI 110002 | 2323 7617<br>2323 3841 |
| Eastern | : 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi<br>KOLKATA 700054 | 2337 8499, 2337 8561<br>2337 8626, 2337 9120 |
| Northern | : Plot No. 4-A, Sector 27-B, Madhya Marg<br>CHANDIGARH 160019 | 265 0206<br>265 0290 |
| Southern | : C.I.T. Campus, IV Cross Road, CHENNAI 600113 | 2254 1216, 2254 1442<br>2254 2519, 2254 2315 |
| Western | : Manakalaya, E9 MIDC, Marol, Andheri (East)<br>MUMBAI 400093 | 2832 9295, 2832 7858<br>2832 7891, 2832 7892 |

**Branches** : AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. COIMBATORE. DEHRADUN. DURGAPUR. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. JAMMU. JAMSHEDPUR. KOCHI. LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAIPUR. RAJKOT. VISAKHAPATNAM.

Published by BIS, New Delhi